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# **Is there a link between wealth and cardiovascular disease risk factors among Hispanic/Latinos? Results from the HCHS/SOL Sociocultural Ancillary Study**

## ***Running head: Wealth and CVD risk factors among Hispanic/Latinos***

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### **Corrigendum**

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When the above article was first published online, Venera Bekteshi's name was incorrectly spelt. This has now been corrected in the online version.

The authors apologize for this error.

## **Is there a link between wealth and cardiovascular disease risk factors among Hispanic/Latinos? Results from the HCHS/SOL Sociocultural Ancillary Study**

### **Abstract**

**Objective.** To examine the relationship between wealth and cardiovascular disease risk factors among Hispanic/Latinos of diverse backgrounds.

**Design.** This cross-sectional study used data from 4,971 Hispanic/Latinos, 18 to 74 years, who participated in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) baseline exam and the HCHS/SOL Sociocultural Ancillary Study. Three objectively measured cardiovascular disease risk factors (hypertension, hypercholesterolemia, and obesity) were included. Wealth was measured using an adapted version of the *Home Affluence Scale*, which included questions regarding the ownership of a home, cars, computers, and recent vacations.

**Results.** After adjusting for *traditional* socioeconomic indicators (income, employment, education), and other covariates, we found that wealth was not associated with hypertension, hypercholesterolemia or obesity. Analyses by sex showed that middle-wealth women were less likely to have hypercholesterolemia or obesity. Analyses by Hispanic/Latino background groups showed that while wealthier Central Americans were less likely to have obesity, wealthier Puerto Ricans were more likely to have obesity.

**Conclusion.** This is the first study to explore the relationship between wealth and health among Hispanic/Latinos of diverse backgrounds, finding only partial evidence of this association. Future studies should utilize more robust measures of wealth, and address mechanisms by which wealth may impact health status among Hispanic/Latinos of diverse backgrounds in longitudinal designs.

**Key words:** Wealth; cardiovascular disease risk factors; hypertension; hypercholesterolemia; obesity; Hispanic/Latinos.

**Is there a link between wealth and cardiovascular disease risk factors among Hispanic/Latinos? Results from the HCHS/SOL Sociocultural Ancillary Study**

## 1. Introduction

The Hispanic/Latino population is the largest and one of the fastest-growing racial/ethnic minority groups in the United States. Recent evidence shows that cardiovascular diseases are increasingly leading causes of death among Hispanic/Latinos (Mozaffarian et al. 2016). Findings from the Hispanic Community Health Study/ Study of Latinos (HCHS/SOL) show that hypertension, hypercholesterolemia and obesity were the three most prevalent cardiovascular risk factors among Hispanic/Latinos of diverse backgrounds (Davignus et al. 2012). Higher levels of acculturation (measured primarily as a language/media/ethnic relations transition from Spanish to English) and lower socioeconomic status have been linked to cardiovascular disease risk (Diez-Roux et al. 2005, Morales, Leng, and Escarce 2011).

Previous research has linked higher socioeconomic status (SES) to better cardiovascular health status across various population groups and settings (Adler and Rehkopf 2008). Among Hispanic/Latinos, however, the association between SES and cardiovascular health has been inconsistent (Boykin et al. 2011; Karlamangla et al. 2010; Gallo, de los Monteros, et al. 2009). For instance, Boykin et al found that while higher SES was strongly associated with lower CVD risk factors (hypertension, diabetes, smoking, and BMI) among non-Hispanic White participants, only diabetes followed a similar pattern for Hispanic/Latinos. Other research suggest that the diversity within the pan-ethnic group Hispanic/Latinos may play a role in the SES-health association (Gallo, de los Monteros, et al. 2009).

Socioeconomic status has been commonly measured via *traditional* indicators including income, education, and employment status (Chen and Paterson 2006, Macleod et al. 2005). Although valuable SES indicators, these markers may be less optimal predictors of cardiovascular health in low-income ethnic minority or immigrant populations (Gallo, Penedo, et al. 2009). For instance, research has shown that wealth (financial resources accumulated by individuals or households) vary substantially among different racial/ethnic groups, even among

those with similar income levels (Braveman et al. 2005). As a result, researchers have proposed widespread use of additional measures of SES, such as wealth (Akresh 2011, Pollack et al. 2007).

Wealth generally refers to financial resources accumulated by individuals or households. While income provides a relatively short-term account of financial resources, wealth can include savings (assets that can be quickly converted into cash); stocks, bonds, inheritance, and real estate (assets that cannot be quickly converted into cash); and net worth (assets minus outstanding debts) (Lee 1996). Therefore, the relationship between wealth and health, may be relevant to explore among racial/ethnic minorities and immigrant populations (Akresh 2011, Braveman et al. 2005). Through the recent economic crisis, Hispanic/Latino and African American households saw the largest reductions in their net worth, due primarily to the collapse of the housing market (Kochlar, Fry, and Taylor 2011).

Despite its apparent advantage as a marker of socioeconomic status, wealth has not been widely used in health research (Hajat et al. 2010, Pollack et al. 2007). Issues such as recall bias and the lack of standardized, brief measures have limited its widespread use (Duncan and Petersen 2001). Similarly, little research on the connections between wealth and health has been conducted among Hispanic/Latino populations, and available results are somewhat contradictory. In two separate studies among older Hispanic/Latino respondents, one found that net worth was not significantly associated with higher cognitive ability (Cagney and Lauderdale 2002), whereas another found that wealth was significantly associated with self-rated health (Pollack et al. 2013). To our knowledge no previous study has analyzed the association between wealth and cardiovascular disease risk factors among Hispanic/Latinos. The only previous comparable study, using data from the Panel Study on Income Dynamics, could not disaggregate analyses by Hispanic/Latino ethnicity, and thus included a white/non-white dummy variable (Hajat et al. 2010). Therefore, the purpose of the current study was to

examine the association between wealth and cardiovascular disease risk factors (hypertension, hypercholesterolemia, and obesity) among Hispanic/Latinos of diverse backgrounds.

## **2. Methods**

### ***2.1. Study population***

The Hispanic Community Health Study/Study of Latinos (HCHS/SOL) is a population-based, prospective cohort study designed to monitor chronic disease risk factors among Hispanic/Latinos of diverse backgrounds. A total of 16,415 Hispanic/Latino persons aged 18-74 years, were recruited from the Bronx, NY, Chicago, IL, Miami, FL, and San Diego, CA, using a two-stage probability sample of household addresses. The selected communities are in diverse regions of the US and represent some of the largest Hispanic/Latino urban metropolitan areas (LaVange et al. 2010). Sampling weights were generated to reflect the probabilities of selection at each stage, post-stratified for non-response, and calibrated to US 2010 Census population distributions by location, age, and gender. Further details regarding the HCHS/SOL study design have been described elsewhere (LaVange et al. 2010, Sorlie et al. 2010).

The HCHS/SOL Sociocultural Ancillary Study (SCAS) is a cross-sectional cohort study of associations between sociocultural and psychosocial factors and prevalence of CVD and metabolic syndrome and its component risk factors. A total of 5,313 participants distributed equally across the four field centers participated between February 2010 and June 2011. The Sociocultural Ancillary Study sample can be considered a representative sub-sample of the HCHS/SOL parent study, with the exception of lower participation in some higher SES strata. A more detailed description of the SCAS study has been published elsewhere (Gallo et al. 2014). The current cross-sectional study used data from 4,971 Hispanic/Latinos who had no missing data among the variables included in this paper's analyses. When comparing the missing vs. non-missing (analytic) sample across all variables, there were significant (at  $p < 0.05$  level)

differences for the following variables: hypertension, middle income (\$20,00 – 50,000), unreported income, and Mexican background group.

## **2.2. Measures**

### **2.2.1. Cardiovascular disease risk factors**

The three most prevalent cardiovascular disease risk factors measured during the HCHS/SOL baseline examination were included in this study: *hypertension*, *hypercholesterolemia* and *obesity* (Davignus et al. 2012). Following Davignus et al, *hypertension* was defined as a systolic blood pressure  $\geq 140$  mm Hg, or diastolic blood pressure  $\geq 90$  mm Hg, or taking antihypertensive medication. *Hypercholesterolemia* was defined as serum total cholesterol level  $\geq 240$  mg/dL, HDL cholesterol  $< 40$  mg/dL, LDL cholesterol  $\geq 160$  mg/dL, or taking cholesterol-lowering medication. *Obesity* was defined as body mass index  $\geq 30$ , calculated as weight in kilograms divided by height in meters squared.

### **2.2.2. Wealth**

Wealth was measured using: (a) an adapted version of the Home Affluence Scale (HASC) (Wardle, Robb, and Johnson 2002), which includes questions regarding ownership of a home, cars, computers; and recent vacations; and (b) two items taken from the MacArthur Sociodemographic Questionnaire: having the ability to maintain a standard of living greater than or equal to 6 months; and having accrued savings greater than or equal to \$5,000 (McArthur Research Network on SES & Health 2008). Following Wardle et al, these six indicators were combined to compute a wealth score by adding a point for each of the following: the family owning a car, owning two cars, the family owning the home, the family owning a computer, owning two computers, the family traveling for vacation in the past 12 months, having the ability to maintain a standard of living greater than or equal to 6 months, and having accrued savings



greater than or equal to \$5,000. The resulting count scale had possible scores ranging from 0 to 8. Then, we recoded the wealth score into three categories: *low* (0-2), *middle* (3-5); and *high* (6-8).

### **2.2.3. Traditional SES factors**

Three *traditional* SES measures from the HCHS/SOL baseline examination were included:

*Annual household income* (“Counting the income of all the members of your household, was your household income for the year”: < \$20,000; \$20,000 – 50,000; > \$50,000; not reported);

*educational attainment* (“How many years of schooling in total have you completed?” Less than high school; high school or higher); and *employment status* (Unemployed or currently

employed). These three variables were only moderately correlated with the wealth score (income,  $r = 0.41$ ; education,  $r = 0.25$ ; employment,  $r = 0.14$ ,  $p < 0.01$ ).

### **2.2.4. Hispanic/Latino background groups**

Participants were asked to self-identify with a Hispanic/Latino background group: *Central*

*American, Cuban, Dominican, Mexican, Puerto Rican, or South American*. They could also

select *More than one group/Other heritage*. Due to its small sample size ( $n=126$ ), this category

was not analyzed separately. The fact that people with certain Hispanic/Latino backgrounds

tend to concentrate in specific geographic areas meant that not all backgrounds were present in

each study site, creating confounding between background and site. In particular, Cubans were

predominantly in Miami, Dominicans were predominantly in the Bronx, and participants from

San Diego were predominantly Mexican. Therefore, to capture the effects of both field center

and background, multivariable analyses included a 17-level background-by-center interaction

term.

### **2.2.5. Other covariates**

Other variables included demographic variables (age, sex, marital status, family size, years in the US, country of origin –US/foreign-born), acculturation, health behaviors (physical activity, diet) and healthcare access (health insurance coverage). Acculturation was measured using a modified 10-item version of the widely used *Short Acculturation Scale for Hispanics –SASH* (Marin et al. 1987). The SASH scale is a brief, valid, and reliable tool to identify the acculturation level of Hispanic/Latino respondents by measuring language use, media, and ethnic social relations. Physical activity was measured using the World Health Organization *Global Physical Activity Questionnaire – GPAQ* (Armstrong and Bull 2006). A dummy variable measuring participation in moderate (medium) to vigorous (high) physical activity following the 2008 CDC physical activity guidelines was created (Daviglius et al. 2012). The diet score was calculated for the entire SOL sample with collected diet data by assigning participants a score of 1-5 according to their sex-specific quintile of daily intake of saturated fatty acids, potassium, calcium, and fiber, with 5 representing the most favorable quintile, i.e., lowest quintile of intake for saturated fatty acids and highest quintile of intake for potassium, calcium, and fiber; the 4 scores were summed and the higher 40 percentile considered a healthier diet (Liu et al. 2012).

### **2.3. Statistical analysis**

The HCHS/SOL cohort was selected through a stratified multi-stage area probability sample, which allowed HCHS/SOL to estimate the prevalence of diseases and baseline risk factors in the target population (defined as all non-institutionalized Hispanic/Latino adults aged 18-74 years old residing in the four communities) and weighted relative to the 2010 census to adjust for sampling probability and nonresponse. Weighted summary statistics were estimated for all study variables. When comparing across wealth groups, overall differences (omnibus test) noted among categorical variables were based on the Rao-Scott statistic for the Pearson chi-

squared test of difference for contingency tables, whereas the overall differences for continuous variables were based on the adjusted Wald test.

Multivariable logistic regression analyses were conducted to analyze the associations between wealth and CVD risk factors using a three-step process. Model 1 included wealth, model 2 added *traditional* SES factors, and model 3 included other covariates. All analyses were adjusted for HCHS/SOL complex survey design and sampling weights using the svy commands in Stata IC 12.1 (StataCorp, College Station, TX). The unconditional variance-estimation approach, subpop() option in Stata, was used to calculate point estimates and standard errors (or confidence intervals). This approach took into account all available strata and primary sampling units based on the HCHS/SOL SCAS complex survey design (West, Berglund, and Heeringa 2008).

### 3. Results

< Insert Table 1 about here >

#### 3.1. Participant characteristics

Table 1 shows the summary statistics among HCHS/SOL Sociocultural Ancillary Study participants. The mean age was 42.3 years, and differed by wealth (ranging from 45 years in the low-wealth category to 41.8 in the high-wealth category). Nearly 49% were married or living with a partner. The average size of the household was 3.3 members. Over 73% lived in the United States for 10 or more years, while 31% were US-born. Fifty-two percent had health insurance. Prevalence of CVD risk factors in our study was similar to estimates from the HCHS/SOL parent study (Davignus et al. 2012): hypertension (23.7%), hypercholesterolemia (42.9%), and obesity (41.3%).

Over a third of participants had low-wealth (37%), while 45% were in the middle-wealth category and only 18% were in the high-wealth category. For *traditional* SES factors, 47% had an annual household income of less than \$20,000, 36% had an annual household income

between \$20,000 and \$50,000, and 10% had an annual household income of over \$50,000. More than half (68%) had high school/GED education or higher. Almost half (45%) were employed at the time of the survey.

< Insert Table 2 about here >

### **3.2. Multivariable regression results**

Wealthy Hispanic/Latinos were less likely to have hypertension (middle wealth, OR = 0.62, 95%CI: 0.50 – 0.75; and high wealth, OR = 0.63, 95%CI: 0.46 – 0.89), and hypercholesterolemia (middle wealth, OR = 0.76, 95%CI: 0.64 – 0.92) in initial models. However, final multivariable logistic regressions showed that, after adjusting for *traditional* SES factors and other covariates, wealth was not associated with hypertension, hypercholesterolemia or obesity (Table 2). None of the *traditional* SES measures were associated with hypertension. However, Hispanic/Latinos with education at the high school/GED or higher were less likely to have hypercholesterolemia (OR = 0.80, 95%CI: 0.67 – 0.97) or obesity (OR = 0.81, 95%CI: 0.67 – 0.99). Also, Hispanic/Latinos with annual household income above \$50,000 were less likely to have obesity (OR = 0.65, 95%CI: 0.44 – 0.97).

We further conducted sensitivity analyses to explore these associations by sex, Hispanic/Latino background group, study site, and country of origin. We found significant interactions between wealth and sex, and wealth and Hispanic/Latino background group. Therefore we proceeded to analyze the association between wealth and CVD risk factors among these subgroups. Supplemental Table 1 presents results by sex. Middle-wealth women were less likely to have hypercholesterolemia or obesity (OR = 0.78, 95%CI: 0.63 – 0.98; OR = 0.74, 95%CI: 0.57 – 0.95, respectively). Among *traditional* SES factors, participants with annual household income between \$20,000 and \$50,000 were less likely to have hypercholesterolemia (OR = 0.74, 95%CI: 0.56 – 0.98); while those with income above \$50,000 and high school/GED

education or higher were less likely to have obesity (OR = 0.51, 95%CI: 0.28 – 0.91; OR = 0.76, 95%CI: 0.60 – 0.95).

Supplemental Tables 2 – 4 present results by Hispanic/Latino background groups (Central American, Cuban, Dominican, Mexican, Puerto Rican, and South American). Wealth was not associated with hypertension or hypercholesterolemia for none of these groups. However, middle-wealth Central Americans were less likely to have obesity (OR = 0.47, 95%CI: 0.31 – 0.71). In turn, high-wealth Puerto Ricans were more likely to have obesity (OR = 2.05, 95%CI: 1.01 – 4.14). Among *traditional* SES factors, Mexicans and South Americans with high school/GED education or higher were less likely to have obesity (OR = 0.67, 95%CI: 0.48 – 0.92; OR = 0.49, 95%CI: 0.28 – 0.85). Central Americans and Dominicans who were employed were also less likely to have obesity (OR = 0.56, 95%CI: 0.37 – 0.84; OR = 0.54, 95%CI: 0.31 – 0.96).

#### **4. Discussion**

This is the first known study to examine the association between wealth and cardiovascular disease risk factors, in a sample of Hispanic/Latinos of diverse backgrounds and using three objectively measured outcomes. Although initial significant associations were found between wealth and hypertension and hypercholesterolemia, significance disappeared after adjusting for *traditional* SES measures and other covariates. No such associations were found between wealth and obesity. We further explored these associations by sex and Hispanic/Latino background groups. Middle-wealth women were less likely to have hypercholesterolemia or obesity. While wealthier Central Americans were less likely to have obesity, wealthier Puerto Ricans were more likely to have obesity.

Previous research in this area has been so far mixed. Whereas a study using data from the Survey of Consumer Finances and the Health and Retirement Survey (both collected in 2004)

found that wealth was associated with self-reported health among older Hispanic/Latinos (Pollack et al. 2013), another study in California found that homeownership (a key measure of wealth) was not associated with self-reported health status, psychological health conditions, and general health conditions among Hispanic/Latinos (Ortiz and Zimmerman 2013). Yet another study, which included similar (albeit self-reported) outcome measures using data from the Panel Study of Income Dynamics, PSID, found that wealth was associated with obesity but not with hypertension (Hajat et al. 2010).

Using HCHS/SOL data, recent studies regarding the connections between *traditional* socioeconomic measures (income, education, employment) and cardiovascular disease risk factors among Hispanic/Latinos of diverse backgrounds reveal the complexity of these associations. HCHS/SOL researchers have found that while income and education are negatively associated with diabetes prevalence (Schneiderman et al. 2014), they are not associated with obesity, except among individuals with annual incomes above \$40,000 –who were more likely to have extreme obesity –BMI > 40 kg/m<sup>2</sup> (Isasi et al. 2015). In turn, income and education were not associated with hypertension prevalence (Sorlie et al. 2014).

Our study has several limitations. First, given the cross-sectional nature of the dataset, no causal inferences can be drawn. Second, wealth was measured using an adapted version of the self-reported *Home Affluence Scale* (Wardle, Robb, and Johnson 2002), which has not been used in previous studies addressing the association between wealth and cardiovascular disease risk factors. Therefore, it is difficult to assess the comparability of our results with previous studies. However, other research has suggested that an even shorter version of our home/family affluence (four instead of eight items) scale could be used as a proxy measure of wealth in population health surveys (Boyce et al. 2006). Future research should consider using more robust measures of wealth, such as those included in the Panel Study of Income Dynamics or the Survey of Consumer Finances (Pfeffer et al. 2016), or community-based measures, such as residential property values (Rehm et al. 2012). The latter may be particularly

useful for racial/ethnic minorities whose wealth status, closely linked to homeownership, has been differentially impacted by the recent housing market crisis. Other researchers have pointed out the limitation of using such measures when they do not account for mortgage debt (Hajat et al. 2010, Ortiz and Zimmerman 2013).

Other socioeconomic measures were also self-reported, which can introduce response and social desirability bias into our findings. For instance, 7.6% of the sample did not answer to the question on income. Third, Hispanic/Latino participants were recruited in four urban areas (the Bronx, NY, Chicago, IL, Miami, FL, and San Diego, CA). Therefore, our results may not be generalizable to the broader Hispanic/Latino population in the United States.

On the other hand, our significant obesity findings by sex and Hispanic/Latino background groups (e.g., where middle-wealth women were less likely to have hypercholesterolemia or obesity; or where middle-wealth Central Americans were less likely to have obesity while but high-wealth Puerto Ricans were more likely to be obese) challenge the assumption of Hispanic/Latinos as a single “monolithic” pan-ethnic group (Mora 2014). These findings may also concur with previous research suggesting that different SES indicators may influence health outcomes (such as CVD risk factors) through various mechanisms, and at different points across a person’s lifespan (Braveman et al. 2005, Braveman et al. 2010). In that sense, the unique characteristics of the Hispanic Community Health Study/ Study of Latinos (e.g., multisite, cohort, representative of the Hispanic/Latino population in the four cities/study sites) may allow researchers to further explore these issues, both in terms of the diversity of its Hispanic/Latino background groups, and the possibility of following them up over time.

Notwithstanding these limitations, the present study contributes to our understanding of the relationship between wealth and cardiovascular disease risk factors among Hispanic/Latinos of diverse backgrounds. Future studies should consider more robust measures of wealth, address mechanisms via which wealth may impact health status of Hispanic/Latinos of diverse backgrounds in longitudinal designs, and explore factors other than wealth and *traditional* SES

measures that may be influencing cardiovascular disease risk factors among Hispanic/Latinos of diverse backgrounds.

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Table 1. Summary Statistics by Wealth of Hispanic/Latinos.<sup>a</sup>

Characteristic	Total	Low	Wealth Middle	High	P <sup>c</sup>
	N= 4,971 <sup>b</sup>	n= 1,894	n= 2,235	n= 842	
	Mean or % (95% CI)	Mean or % (95% CI)	Mean or % (95% CI)	Mean or % (95% CI)	
<b>Cardiovascular risk factors</b>					
Hypertension	23.7 (21.8, 25.7)	29.2 (26.0, 32.6)	20.3 (18.2, 22.5)	20.8 (16.2, 26.3)	< 0.001
Hypercholesterolemia	42.9 (40.5, 45.3)	46.8 (43.2, 50.4)	40.1 (37.0, 43.4)	41.7 (36.4, 47.1)	0.018
Obesity	41.3 (39.0, 43.6)	43.3 (40.0, 46.7)	40.2 (36.5, 44.1)	39.8 (34.2, 45.8)	0.440
<b>Traditional SES</b>					
Income					
<\$20,000	47.0 (44.5, 49.6)	67.4 (64.2, 70.6)	41.7 (38.5, 45.0)	17.9 (13.6, 23.1)	< 0.001
\$20,000 – 50,000	35.6 (33.3, 37.9)	21.6 (19.1, 24.5)	43.8 (40.5, 47.1)	44.0 (38.3, 50.0)	
>\$50,000	9.7 (7.9, 12.0)	2.2 (0.8, 5.9)	6.5 (5.0, 8.4)	33.5 (27.8, 39.7)	
Not reported	7.6 (6.6, 8.8)	8.6 (7.1, 10.5)	8.0 (6.6, 9.7)	4.6 (3.1, 6.8)	
Education					
Less than high school	32.2 (29.9, 34.5)	45.1 (41.5, 48.7)	27.2 (24.6, 29.9)	17.8 (13.6, 22.8)	< 0.001
High school or higher	67.8 (65.5, 70.1)	54.9 (51.3, 58.5)	72.8 (70.1, 75.4)	82.2 (77.2, 86.4)	
Employment status					
Unemployed	55.4 (53.1, 57.7)	63.9 (60.2, 67.5)	52.7 (49.6, 55.8)	44.3 (39.1, 49.5)	< 0.001
Currently employed	44.6 (42.3, 46.9)	36.1 (32.5, 39.8)	47.3 (44.2, 50.4)	55.7 (50.5, 60.9)	
<b>Other covariates</b>					
Age (years)	42.3 (41.5, 43.1)	45.0 (43.8, 46.2)	40.2 (39.3, 41.1)	41.8 (39.9, 43.6)	< 0.001
Women	54.7 (52.7, 56.8)	59.7 (56.6, 62.7)	53.0 (49.6, 56.3)	48.9 (43.7, 54.2)	< 0.001
Married/ living with a partner	48.7 (46.4, 51.0)	41.4 (37.9, 45.0)	51.2 (47.9, 54.3)	57.9 (51.9, 63.6)	< 0.001
Family size	3.3 (3.2, 3.4)	2.9 (2.8, 3.0)	3.6 (3.4, 3.7)	3.4 (3.2, 3.6)	< 0.001
US residence ≥ 10	73.1 (70.1, 75.9)	70.3 (66.3, 74.1)	71.3 (67.4, 74.9)	83.4 (78.5, 87.3)	< 0.001
SASH <sup>†</sup> score	2.2 (2.1, 2.2)	1.9 (1.8, 2.0)	2.2 (2.1, 2.3)	2.5 (2.4, 2.6)	< 0.001
Country of origin					
Foreign-born	69.1 (66.1, 71.9)	73.7 (69.8, 77.2)	69.6 (65.2, 73.6)	58.4 (52.4, 64.2)	< 0.001
US-born	30.9 (28.1, 33.9)	26.3 (22.8, 30.2)	30.4 (26.4, 34.8)	41.6 (35.8, 47.6)	
Moderate-to-vigorous physical activity	63.6 (61.6, 65.7)	61.8 (58.5, 65.1)	63.0 (59.7, 66.1)	69.1 (64.0, 73.7)	0.062
Diet score, higher 40% <sup>d</sup>	46.5 (44.1, 48.9)	41.6 (38.3, 45.0)	46.9 (43.4, 50.6)	55.6 (49.9, 61.1)	< 0.001
Health insurance	51.9 (49.3, 54.5)	53.7 (50.0, 57.4)	47.0 (43.6, 50.4)	60.4 (54.0, 66.5)	< 0.001
<b>Hispanic/Latino background groups</b>					
Central American	7.5 (6.1, 9.3)	9.7 (7.6, 12.3)	7.4 (5.9, 9.3)	3.5 (2.3, 5.2)	< 0.001
Cuban	19.8 (15.9, 24.3)	22.4 (17.6, 28.1)	21.4 (17.0, 26.7)	10.0 (6.8, 14.4)	< 0.001
Dominican	11.5 (9.7, 13.7)	15.4 (12.6, 18.6)	10.6 (8.0, 13.9)	5.8 (3.8, 8.6)	< 0.001
Mexican	37.7 (33.8, 41.8)	27.5 (22.8, 32.7)	39.4 (34.7, 44.4)	54.7 (48.3, 60.9)	< 0.001
Puerto Rican	15.5 (13.4, 17.8)	18.8 (16.0, 22.1)	12.1 (10.0, 14.6)	16.9 (12.0, 23.1)	< 0.001
South American	4.7 (3.9, 5.7)	3.8 (2.8, 5.1)	5.2 (4.1, 6.7)	5.2 (3.6, 7.3)	0.159
<b>Study sites</b>					
The Bronx	29.6 (25.8, 33.8)	40.7 (35.0, 46.7)	24.6 (20.3, 29.4)	19.1 (13.7, 26.1)	< 0.001
Chicago	16.3 (13.8, 19.2)	14.2 (11.4, 17.4)	17.0 (14.0, 20.5)	19.2 (15.1, 24.1)	
Miami	28.3 (23.1, 34.1)	33.1 (26.5, 40.5)	30.0 (24.3, 36.3)	14.0 (10.2, 18.9)	
San Diego	25.8 (21.9, 20.1)	12.0 (8.7, 16.3)	28.4 (24.0, 33.3)	47.8 (39.7, 55.9)	

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*Abbreviations:* SES = socioeconomic status; SASH = Short Acculturation Scale for Hispanics (Marin et al, 1987).

<sup>a</sup> Summary statistics shown here are weighted to the US 2010 Census population distribution.

<sup>b</sup> Total N included those who reported their Hispanic/Latino background as *More than one/Other heritage* (n=126).

<sup>c</sup>  $P < 0.001$ . Overall differences (omnibus test) noted among categorical variables were based on the Rao-Scott statistic for the Pearson chi-squared test of difference, whereas the overall differences for continuous variables were based on the adjusted Wald test.

<sup>d</sup> Diet score was calculated by assigning participants a score of 1-5 according to their sex-specific quintile of daily intake of saturated fatty acids, potassium, calcium, and fiber, with 5 representing the most favorable quintile (i.e., lowest quintile of intake for saturated fatty acids and highest quintile of intake for potassium, calcium and fiber). The 4 scores were summed and the higher 40 percentile considered a healthier diet (Daviglius et al., 2012; Liu et al., 2012).

Table 2. Weighted Logistic Regression Results of the Association between Wealth and Cardiovascular Risk Factors among Hispanic/Latinos.<sup>a</sup>

	<b>Hypertension</b>	<b>Hypercholesterolemia</b>	<b>Obesity</b>
	OR (95% CI)	OR (95% CI)	OR (95% CI)
<b>Wealth</b>			
Low	Reference	Reference	Reference
Middle	0.85 (0.67, 1.07)	0.90 (0.74, 1.09)	0.92 (0.75, 1.14)
High	0.72 (0.49, 1.05)	0.95 (0.68, 1.33)	0.97 (0.73, 1.30)
<b>Traditional SES factors</b>			
Income			
< \$20,000	Reference	Reference	Reference
\$20,000 – \$50,000	1.17 (0.93, 1.49)	0.84 (0.69, 1.01)	1.04 (0.84, 1.28)
> \$50,000	1.06 (0.69, 1.64)	0.89 (0.60, 1.33)	0.65 (0.44, 0.97)
Not reported	1.07 (0.73, 1.56)	1.27 (0.91, 1.78)	1.05 (0.76, 1.45)
Education			
Less than high school	Reference	Reference	Reference
High school or higher	1.05 (0.83, 1.31)	0.80 (0.67, 0.97)	0.81 (0.67, 0.99)
Employment			
Unemployed	Reference	Reference	Reference
Currently employed	0.90 (0.74, 1.09)	0.91 (0.77, 1.08)	0.93 (0.78, 1.11)

*Abbreviations:* SES = socioeconomic status.

<sup>a</sup> Adjusted for other covariates including: age, sex, marital status, family size, US residence  $\geq 10$  years, SASH (Short Acculturation Scale for Hispanics) score, Study sites\*Hispanic/Latino background interaction term, moderate-to-vigorous physical activity, diet score, and health insurance coverage.

Supplemental Table 1. Weighted Logistic Regression Results of the Association between Wealth and CVD Risk Factors (Hypertension, Hypercholesterolemia, Obesity) by Sex.<sup>a</sup>

	Hypertension		Hypercholesterolemia		Obesity	
	Women OR (95% CI)	Men OR (95% CI)	Women OR (95% CI)	Men OR (95% CI)	Women OR (95% CI)	Men OR (95% CI)
<b>Wealth</b>						
Low	Reference	Reference	Reference	Reference	Reference	Reference
Middle	0.79 (0.59, 1.07)	0.91 (0.64, 1.30)	0.78 (0.63, 0.98)	0.96 (0.72, 1.29)	0.74 (0.57, 0.95)	1.23 (0.90, 1.67)
High	0.64 (0.37, 1.10)	0.83 (0.51, 1.37)	0.78 (0.50, 1.22)	1.14 (0.73, 1.79)	0.84 (0.58, 1.23)	1.22 (0.79, 1.86)
<b>Traditional SES factors</b>						
<b>Income</b>						
< \$20,000	Reference	Reference	Reference	Reference	Reference	Reference
\$20,000 – \$50,000	1.03 (0.75, 1.43)	1.25 (0.90, 1.73)	0.74 (0.56, 0.98)	0.91 (0.68, 1.21)	1.05 (0.81, 1.36)	1.04 (0.76, 1.41)
> \$50,000	0.85 (0.42, 1.71)	1.12 (0.60, 2.10)	0.57 (0.31, 1.06)	1.18 (0.75, 1.87)	0.51 (0.28, 0.91)	0.72 (0.43, 1.20)
Not reported	1.19 (0.75, 1.87)	0.69 (0.29, 1.21)	1.21 (0.82, 1.80)	1.29 (0.61, 2.70)	1.09 (0.76, 1.56)	1.04 (0.56, 1.94)
<b>Education</b>						
Less than high school	Reference	Reference	Reference	Reference	Reference	Reference
High school or higher	1.07 (0.77, 1.47)	1.02 (0.73, 1.42)	0.87 (0.67, 1.13)	0.75 (0.56, 1.01)	0.76 (0.60, 0.95)	0.94 (0.71, 1.24)
<b>Employment</b>						
Unemployed	Reference	Reference	Reference	Reference	Reference	Reference
Currently employed	0.86 (0.67, 1.10)	0.87 (0.64, 1.20)	0.86 (0.69, 1.09)	0.90 (0.69, 1.19)	0.85 (0.68, 1.06)	0.81 (0.62, 1.05)

Abbreviations: SES = socioeconomic status.

<sup>a</sup> Adjusted for other covariates including: age, sex, marital status, family size, US residence ≥ 10 years, SASH (Short Acculturation Scale for Hispanics) score, Study sites\*Hispanic/Latino background interaction term, moderate-to-vigorous physical activity, diet score, and health insurance coverage.

Supplemental Table 2. Weighted Logistic Regression Results of the Association between Wealth and Hypertension by Hispanic/Latino Background Groups.<sup>a</sup>

	<b>Hypertension</b>					
	<i>Central American</i>	<i>Cuban</i>	<i>Dominican</i>	<i>Mexican</i>	<i>Puerto Rican</i>	<i>South American</i>
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
<b>Wealth</b>						
Low	Reference	Reference	Reference	Reference	Reference	Reference
Middle	0.80 (0.46, 1.39)	0.68 (0.44, 1.05)	1.15 (0.58, 2.30)	1.14 (0.67, 1.93)	0.93 (0.49, 1.75)	0.76 (0.34, 1.68)
High	0.70 (0.29, 1.70)	1.05 (0.41, 2.69)	3.28 (0.92, 11.68)	0.75 (0.40, 1.40)	0.52 (0.20, 1.34)	0.60 (0.21, 1.69)
<b>Traditional SES factors</b>						
<b>Income</b>						
< \$20,000	Reference	Reference	Reference	Reference	Reference	Reference
\$20,000 – \$50,000	0.81 (0.41, 1.60)	1.40 (0.89, 2.21)	1.07 (0.54, 2.12)	0.98 (0.64, 1.48)	1.89 (0.94, 3.81)	1.30 (0.55, 3.08)
> \$50,000	0.98 (0.15, 6.49)	1.31 (0.37, 4.62)	0.47 (0.10, 2.08)	0.66 (0.32, 1.37)	1.81 (0.71, 4.58)	5.06 (1.04, 24.68)
Not reported	0.86 (0.37, 1.97)	1.22 (0.71, 2.10)	0.29 (0.09, 0.92)	1.91 (0.80, 4.52)	0.85 (0.38, 1.89)	0.55 (0.11, 2.68)
<b>Education</b>						
Less than high school	Reference	Reference	Reference	Reference	Reference	Reference
High school or higher	0.93 (0.53, 1.63)	1.11 (0.68, 1.83)	1.78 (0.89, 3.58)	1.15 (0.76, 1.73)	0.93 (0.61, 1.43)	0.44 (0.15, 1.24)
<b>Employment</b>						
Unemployed	Reference	Reference	Reference	Reference	Reference	Reference
Currently employed	0.73 (0.42, 1.26)	0.91 (0.57, 1.47)	0.93 (0.46, 1.88)	1.21 (0.83, 1.78)	0.70 (0.43, 1.13)	0.31 (0.15, 0.66)

Abbreviations: SES = socioeconomic status.

<sup>a</sup> Adjusted for other covariates including: age, sex, marital status, family size, US residence ≥ 10 years, SASH (Short Acculturation Scale for Hispanics) score, Study sites\*Hispanic/Latino background interaction term, moderate-to-vigorous physical activity, diet score, and health insurance coverage.

Supplemental Table 3. Weighted Logistic Regression Results of the Association between Wealth and Hypercholesterolemia by Hispanic/Latino Background Groups.<sup>a</sup>

	Hypercholesterolemia					
	Central American	Cuban	Dominican	Mexican	Puerto Rican	South American
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
<b>Wealth</b>						
Low	Reference	Reference	Reference	Reference	Reference	Reference
Middle	1.09 (0.69, 1.73)	0.98 (0.63, 1.54)	0.81 (0.43, 1.53)	0.86 (0.62, 1.21)	0.86 (0.57, 1.31)	0.72 (0.31, 1.67)
High	1.81 (0.77, 4.25)	1.47 (0.75, 2.90)	0.53 (0.16, 1.75)	0.89 (0.56, 1.40)	0.82 (0.34, 1.99)	0.95 (0.34, 2.66)
<b>Traditional SES factors</b>						
<b>Income</b>						
< \$20,000	Reference	Reference	Reference	Reference	Reference	Reference
\$20,000 – \$50,000	0.94 (0.59, 1.51)	0.81 (0.53, 1.24)	1.10 (0.59, 2.06)	0.90 (0.65, 1.24)	0.67 (0.40, 1.12)	1.54 (0.76, 3.11)
> \$50,000	4.09 (1.18, 14.14)	0.32 (0.09, 1.16)	1.50 (0.48, 4.69)	0.81 (0.46, 1.40)	0.98 (0.47, 2.06)	0.43 (0.09, 1.97)
Not reported	1.21 (0.54, 2.70)	1.29 (0.69, 2.40)	2.26 (0.81, 6.31)	1.13 (0.50, 2.55)	0.91 (0.39, 2.09)	0.93 (0.20, 4.25)
<b>Education</b>						
Less than high school	Reference	Reference	Reference	Reference	Reference	Reference
High school or higher	0.89 (0.50, 1.58)	0.71 (0.48, 1.04)	1.05 (0.54, 2.03)	0.90 (0.66, 1.22)	0.96 (0.60, 1.54)	0.18 (0.08, 0.44)
<b>Employment</b>						
Unemployed	Reference	Reference	Reference	Reference	Reference	Reference
Currently employed	0.61 (0.36, 1.04)	0.99 (0.64, 1.52)	0.85 (0.51, 1.41)	1.02 (0.77, 1.34)	0.88 (0.55, 1.41)	1.10 (0.55, 2.20)

Abbreviations: SES = socioeconomic status.

<sup>a</sup> Adjusted for other covariates including: age, sex, marital status, family size, US residence ≥ 10 years, SASH (Short Acculturation Scale for Hispanics) score, Study sites\*Hispanic/Latino background interaction term, moderate-to-vigorous physical activity, diet score, and health insurance coverage.



Supplemental Table 4. Weighted Logistic Regression Results of the Association between Wealth and Obesity by Hispanic/Latino Background Groups.<sup>a</sup>

	<b>Obesity</b>					
	<i>Central American</i>	<i>Cuban</i>	<i>Dominican</i>	<i>Mexican</i>	<i>Puerto Rican</i>	<i>South American</i>
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
<b>Wealth</b>						
Low	Reference	Reference	Reference	Reference	Reference	Reference
Middle	0.47 (0.31, 0.71)	0.86 (0.59, 1.24)	0.72 (0.40, 1.32)	0.93 (0.62, 1.39)	1.12 (0.76, 1.65)	0.84 (0.39, 1.83)
High	0.68 (0.35, 1.32)	1.21 (0.66, 2.22)	0.34 (0.11, 1.06)	0.86 (0.54, 1.38)	2.05 (1.01, 4.14)	1.15 (0.41, 3.22)
<b>Traditional SES factors</b>						
<b>Income</b>						
< \$20,000	Reference	Reference	Reference	Reference	Reference	Reference
\$20,000 – \$50,000	0.85 (0.52, 1.37)	1.16 (0.72, 1.87)	0.83 (0.40, 1.72)	1.26 (0.90, 1.76)	0.87 (0.54, 1.40)	1.11 (0.57, 2.16)
> \$50,000	1.67 (0.37, 7.66)	0.55 (0.16, 1.90)	0.87 (0.23, 3.28)	0.59 (0.34, 1.00)	0.52 (0.21, 1.28)	0.90 (0.19, 4.15)
Not reported	1.23 (0.59, 2.56)	0.90 (0.55, 1.46)	1.66 (0.60, 4.57)	2.06 (1.10, 3.84)	0.41 (0.19, 0.90)	1.92 (0.51, 7.14)
<b>Education</b>						
Less than high school	Reference	Reference	Reference	Reference	Reference	Reference
High school or higher	0.81 (0.47, 1.40)	1.18 (0.74, 1.89)	0.96 (0.56, 1.64)	0.67 (0.48, 0.92)	1.06 (0.68, 1.64)	0.49 (0.28, 0.85)
<b>Employment</b>						
Unemployed	Reference	Reference	Reference	Reference	Reference	Reference
Currently employed	0.56 (0.37, 0.84)	0.75 (0.51, 1.11)	0.54 (0.31, 0.96)	1.09 (0.81, 1.46)	0.97 (0.63, 1.49)	1.04 (0.55, 1.96)

Abbreviations: SES = socioeconomic status.

<sup>a</sup> Adjusted for other covariates including: age, sex, marital status, family size, US residence ≥ 10 years, SASH (Short Acculturation Scale for Hispanics) score, Study sites\*Hispanic/Latino background interaction term, moderate-to-vigorous physical activity, diet score, and health insurance coverage.